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(54) Burner

(57) The invention provides a head (1) for a burner having a passage (20, 16, 14, 41) through which fluent fuel can be discharged within an outwardly divergent envelope, and further passages, (24, 17, 40) encircling the first, through which an atomizing fluid can be discharged into the fuel as it leaves the burner head. Atomizing fluid also issues from an opening 12 at the centre of the head.

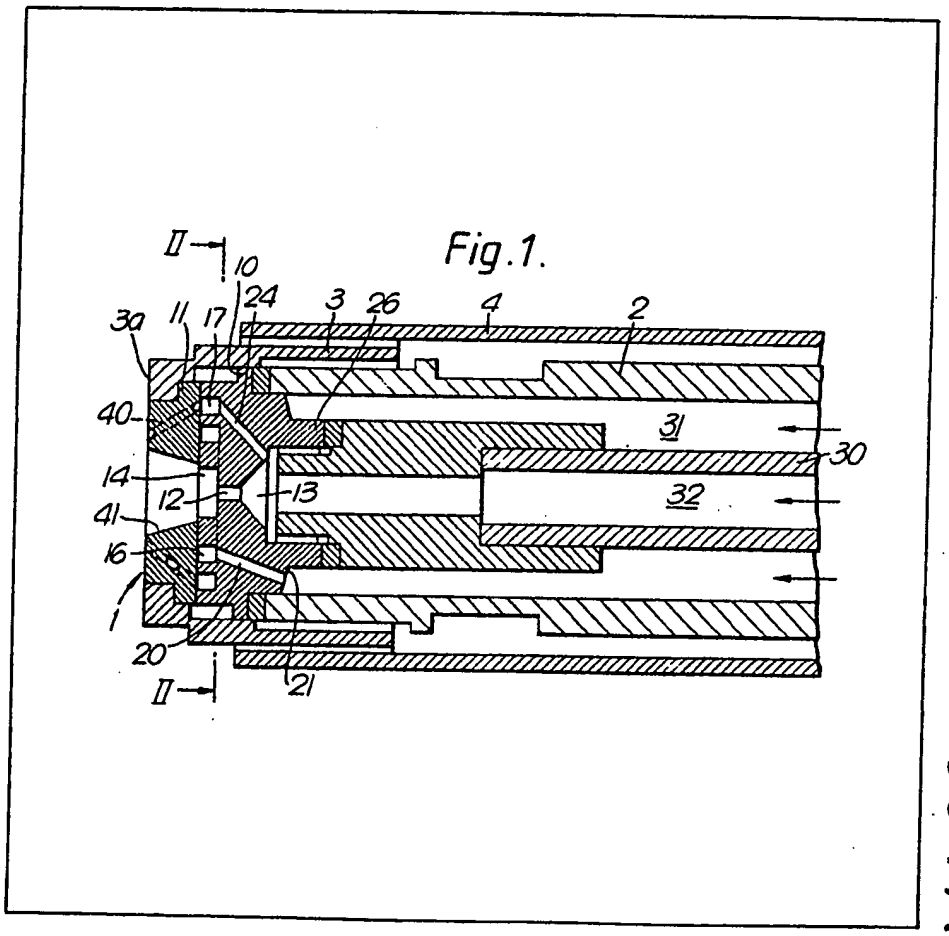

Fig.1.

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.
This print embodies corrections made under Section 117(1) of the Patents Act 1977.

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Fig.1.

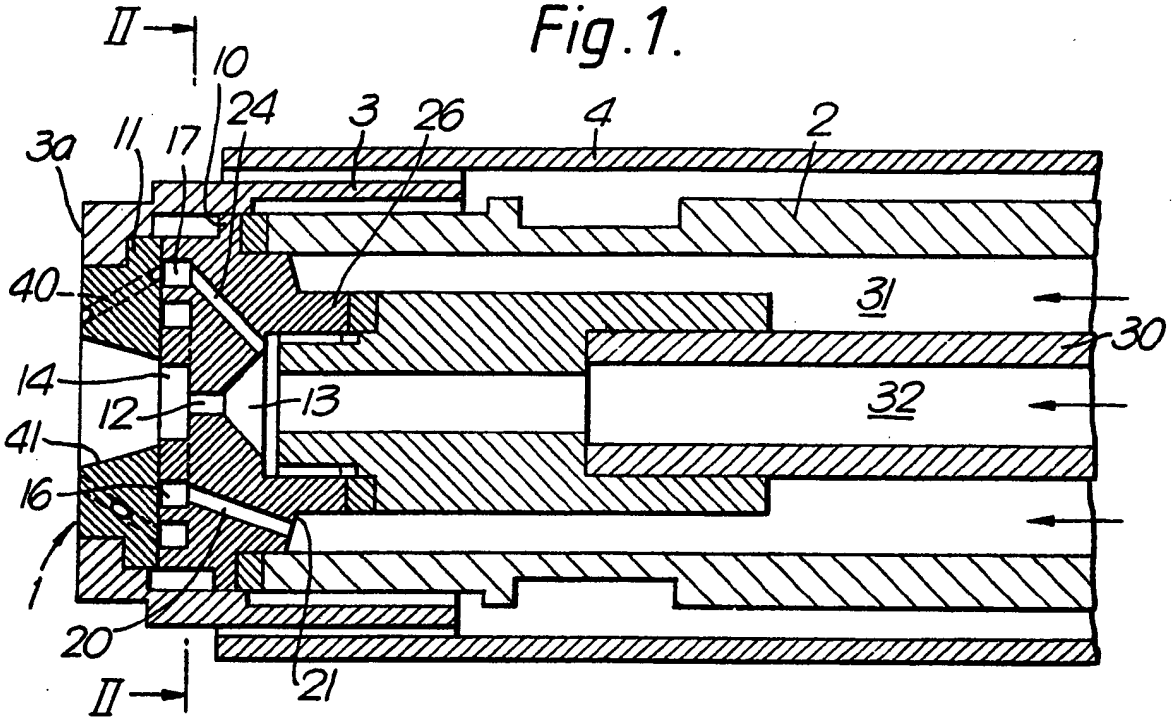


Fig.2.

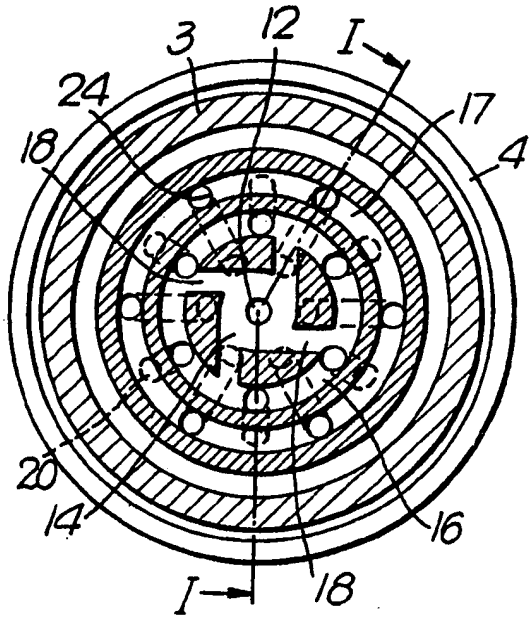
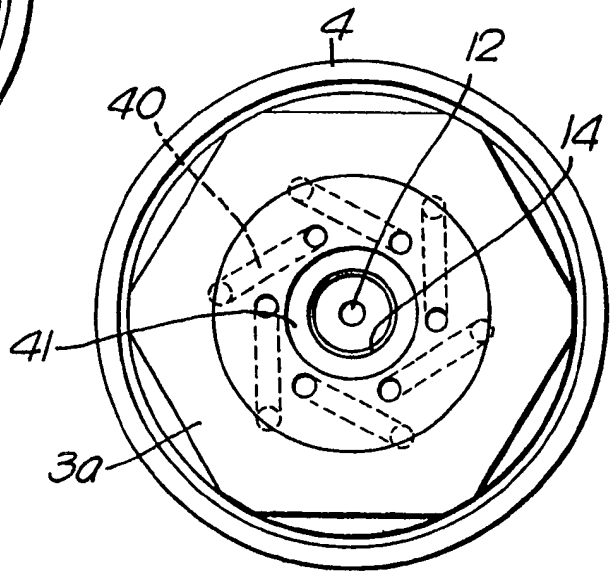


Fig.3.



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SPECIFICATION

Improvements in or relating to burner heads

This invention relates to burner heads for use when fluent fuel is to be used with an atomising fluid.

If the fuel contains abrasive material, then its passage through the head will tend to erode the head, more especially it will tend to erode the edge of any orifice from which it discharges and this can be undesirable if efficient operation of the burner head requires that the edge should be sharp and precisely defined. In a well known form of burner head, the fuel flows through passages in the burner head and atomising fluid is discharged into each passage. This tends to increase the velocity with which the fuel is discharged and so increase its erosive effect.

An object of the invention is to provide a burner head which may be used with fluent fuel and an atomising fluid without the latter aggravating any erosive tendency of the fuel.

According to the present invention, there is provided a burner head having a passage through the head such that fluent fuel supplied to the passage at the inlet end of the head discharges from the outlet end in a stream of which the outer envelope diverges away from the head, and a plurality of further passages encircling the first and being such that an atomising fluid supplied to the further passages at the inlet end of the head discharges into the discharged fluent fuel.

By way of example, an embodiment of the invention will now be described with reference to the accompanying drawings in which

Figure 1 shows an axial section, taken on the line I—I of Figure 2, of a burner head mounted at the end of a burner barrel,

Figure 2 shows a section on the line II—II of Figure 1, and

Figure 3 shows a view of Figure 1 from the left hand end.

In the drawings, the burner head is indicated generally at 1 and is held on to the end of a burner barrel 2 by means of a sleeve 3 screwed on to the barrel 2 and having an inwardly projecting flange 3*a* engaging a peripheral recess in the head 1. A sheathing carrier tube 4 is screwed on to the outside of the sleeve 3.

The head is formed from an inner part 10 and an outer part 11 clamped end-to-end between the flange 3*a* and the end of the barrel 2.

The part 10 is penetrated by a central opening 12 leading from a convergent conical recess 13 at its inlet end to a flat, central, recess 14 at its outlet end. The outlet end face of the part 10 is also provided with two concentric recesses 16 and 17. Four grooves 18 extend between the recess 16 and the recess 14 and serve as tributary passages, the grooves 18 are at right angles to each other so that all make the same angle with a radius extending from the centre of the recess 14 to the centre of the end of the groove. The inner end face of the part 11, abutting the outer end face of the part 10, converts the recesses 16 and 17 and the grooves 18 into ducts or channels.

From the recess 16, six equiangularly spaced channels 20 extend to the peripheral margin 21 of the part 10 which is chamfered to be normal to the axes of the channels 20. Six equiangularly spaced channels 24 extend from the recess 17 to the conical recess 13. The channels 20 and 24 each lie in a radial plane.

A further barrel 30, concentric with the barrel 2, is screwed into a rearward projection 26 of the part 10. The annular duct 31 lying between the barrels 2 and 30 may be connected at its inlet end to a source of fluent fuel, such as a mixture of coal and oil, that escapes through the channels 20 that discharge into the recess 16. The duct 32 extending axially through the further barrel 30 may be connected to a source of steam that discharges partly through the opening 12 and partly through the channels 24 into the recess 17. The outlet from the recess 17 is provided by six equally spaced passages 40 extending skew from the recess 17 to the outer end of the part 11. The outlet ends of the passages 40 lie close to the outlet boundary of the outwardly divergent opening 41 that concentrically penetrates the part 11. The effect of the skewness of the bores 40 will be apparent from the following description of the operation of the apparatus.

The outer part 11 of the burner head is also penetrated by a coaxial, outwardly divergent conical opening 41.

In use of the head that has been described, a mixture of coal and oil (or some other fluent fuel) is supplied through the annular duct 31 and flows through the channels 20 into the recess 16 from which it flows through the tributary passages 18 into the recess 14. The orientation of the passages will cause the fuel to swirl so that it will discharge from the recess 14, swirling in an outwardly divergent envelope defined by the swirl and divergence of the opening 41.

Simultaneously, steam is supplied as an atomizing fluid along the duct 32. Part of the steam will discharge directly through the opening 12, so reinforcing the tendency of the fuel to discharge in a hollow cone, and part will discharge through the channels 24, the recess 17 and the bores 40. As a result of the orientation of the bores 40, the discharging steam will be approximately tangential to the cone of fuel that has discharged from the burner head.

The effect of the discharging steam will be to penetrate and atomize the fuel, but since the interaction occurs wholly outside the head, it cannot have any erosive effect on the head. Since the head is formed in two parts that can be simply constructed, the precision that is desirable for efficient operation can be comparatively easily achieved.

It is envisaged that the discharging steam may swirl in the same, or the opposite, sense as the fuel and it is also envisaged that the passages 40 might be so disposed as to discharge directly forwardly. It is also envisaged that the opening 12 could be dispensed with so that no steam

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discharges centrally into the discharging fuel.

CLAIMS

1. A burner head having a passage through the head such that fluent fuel supplied to the passage at the inlet end of the head discharges from the outlet end in a stream of which the outer envelope diverges away from the head, and a plurality of further passages encircling the first and being such that an atomising fluid supplied to the further passages at the inlet end of the head discharges into the discharged fluent fuel.

2. A burner head as claimed in Claim 1 in which the passage through which the fluent fuel passes is such that the fuel emerging from the passage swirls.

3. A burner head as claimed in Claim 2 in which the passage includes a conical part that diverges away from the inlet end and a plurality of tributary parts that discharge into the conical part and all make the same angle with the radius of the conical part to the centre of the outlet from the tributary part into the conical part.

4. A burner head as claimed in Claim 3 in which an opening is provided through which atomizing fluid may be discharged into the narrower end of the conical part co-axially with the conical part.

5. A burner head as claimed in any of claims 2 to 4 in which the further passages are such that the fluid emerging from each is directed obliquely to the longitudinal axis of the burner head to be biassed in the direction of swirl of the liquid fuel.

6. A burner head as claimed in any of claims 2 to 4 in which the further passages are such that the fluid emerging from each is directed obliquely to the longitudinal axis of the burner head to be biassed in the direction opposite to that of the swirl of the liquid fuel.

7. A burner head as claimed in either of claims 5 and 6 in which the fluid emerging from each further passage is directed to impinge generally tangentially on the discharged fuel.

8. A burner head substantially as described with reference to, and as illustrated by, the accompanying drawing.

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